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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,240	12/07/2000	Thomas George Ference	BUR919990304US1	9501

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EXAMINER

CHU, CHRIS C

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 04/09/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/732,240

Applicant(s)

FERENCE ET AL.

Examiner

Chris C. Chu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 29 is/are pending in the application.
- 4a) Of the above claim(s) 15 - 29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 - 14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's election with traverse of Group I in Paper No. 4 is acknowledged. The traversal is on the ground(s) that "a search of the subject matter of Group I, claims 1 ~ 14, drawn to a structure, would necessarily require a search of the subject matter of Group II, claims 15 ~ 29, drawn to a method of joining the structure." This is not found persuasive because the method claims of the instant invention, especially, claim 23 recites the following sentence, "heating to melt at least a portion of said second solder bumps without melting said first solder bumps." This requires a search in specific subclasses of Class 438, which is the method class. However, the apparatus claims have no such limitation requires no such search. Therefore, examiner does not agree with the basic of the applicant's argument that "Thus the method delineated in Group II is not directed to an independent and distinct matter." However, if applicant states for the record that the apparatus claims and method claims are not patentably distinct, then the restriction requirement will be withdrawn.

The requirement is still deemed proper and is therefore made FINAL.

Claim Objections

2. Claim 1 is objected to because of the following informalities: in line 6, "first solder bumps" should be --the first solder bumps--. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1 ~ 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "substantially lower" in claim 1 is a relative term, which renders the claim indefinite. The term "substantially lower" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1 ~ 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Dalal et al.

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Regarding claim 1, Dalal et al. discloses in Fig. 5 and column 8, lines 49 ~ 51 a structure comprising:

- a first substrate (10) and a second substrate (30); and
- first solder bumps (20) and second solder bumps (38) therebetween,
- wherein the second solder bumps (38) have at least a portion (41) that melts at a substantially lower temperature than first solder bumps.

Regarding claim 2, Dalal et al. discloses in Fig. 5 the second solder bumps (38) being larger than the first solder bumps.

Regarding claim 3, Dalal et al. discloses in Fig. 5 and column 8, lines 49 ~ 51 the second solder bumps (38) comprising a portion (41) having a higher concentration of tin than does the first solder bumps.

Regarding claim 4, Dalal et al. discloses in Fig. 5 and column 8, lines 49 ~ 57 the portion (41) comprising an eutectic concentration of tin.

Regarding claim 5, Dalal et al. discloses in Fig. 5 the portion (41) being adjacent to the second substrate.

Regarding claim 6, Dalal et al. discloses in Fig. 5 the portion (41) being centrally located within the second solder bump.

Regarding claim 7, Dalal et al. discloses in Fig. 5 and column 8, lines 49 ~ 57 the portion being the entire second solder bumps.

Regarding claim 8, Dalal et al. discloses in Fig. 5 and column 6, lines 1 ~ 12 the second solder bumps (38) being for aligning the first substrate and the second substrate before melting the first solder bumps.

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Regarding claim 9, Dalal et al. discloses in Fig. 5 the second solder bumps being larger than the first solder bumps.

Regarding claim 10, Dalal et al. discloses in Fig. 5 and column 8, lines 49 ~ 57 the second solder bumps melting at a temperature at least 25 °C less than the first solder bumps.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1 and 11 ~ 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Degani et al. in view of Ikegami.

Regarding claim 1, Degani et al. discloses in Fig. 1 a structure comprising:

- a first substrate (19) and a second substrate (18); and
- first solder bumps (the one which are connected with 21) and second solder bumps (the others which are not connected with 21) therebetween.

Degani et al. does not disclose the second solder bumps have at least a portion that melts at a substantially lower temperature than first solder bumps. Ikegami discloses in Fig. 3 the second solder bumps (10) have at least a portion (9) that melts at a substantially lower temperature than first solder bumps. It would have been obvious to one of ordinary skill in the art at the time of the present invention was made to use the portion of Ikegami in the second solder

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bumps of Degani et al. in order to improve an electric connection between the second solder bumps and IC chip as taught by Ikegami in column 1, lines 58 and 59.

Regarding claim 11, Degani et al. discloses in Fig. 1 the first substrate (19) comprising a first semiconductor chip.

Regarding claim 12, Degani et al. discloses in Fig. 1 the second substrate (18) comprising a second semiconductor chip.

Regarding claim 13, Degani et al. discloses in Fig. 1 the second chip (18) being larger than the first chip.

Regarding claim 14, Degani et al. discloses in Fig. 1 the second chip (18) further comprising wire bond pads (21) for bonding to a printed circuit board (11).

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Bernier et al., Wang et al., Kang et al., Hikita et al. and Nakatani et al. disclose a flip-chip type semiconductor device.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is (703) 305-6194. The examiner can normally be reached on M-F (10:30 - 7:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (703) 308-1690. The fax phone numbers for the

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organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Chris C. Chu
Examiner
Art Unit 2815

c.c.
April 4, 2002

A handwritten signature in black ink, appearing to read 'Eddie Lee', with a stylized, flowing script.

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800